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Emerson, Monica Jane; Einarsdottir, Hildur; Clemmensen, Line Katrine Harder; Ersbøll, Bjarne Kjær

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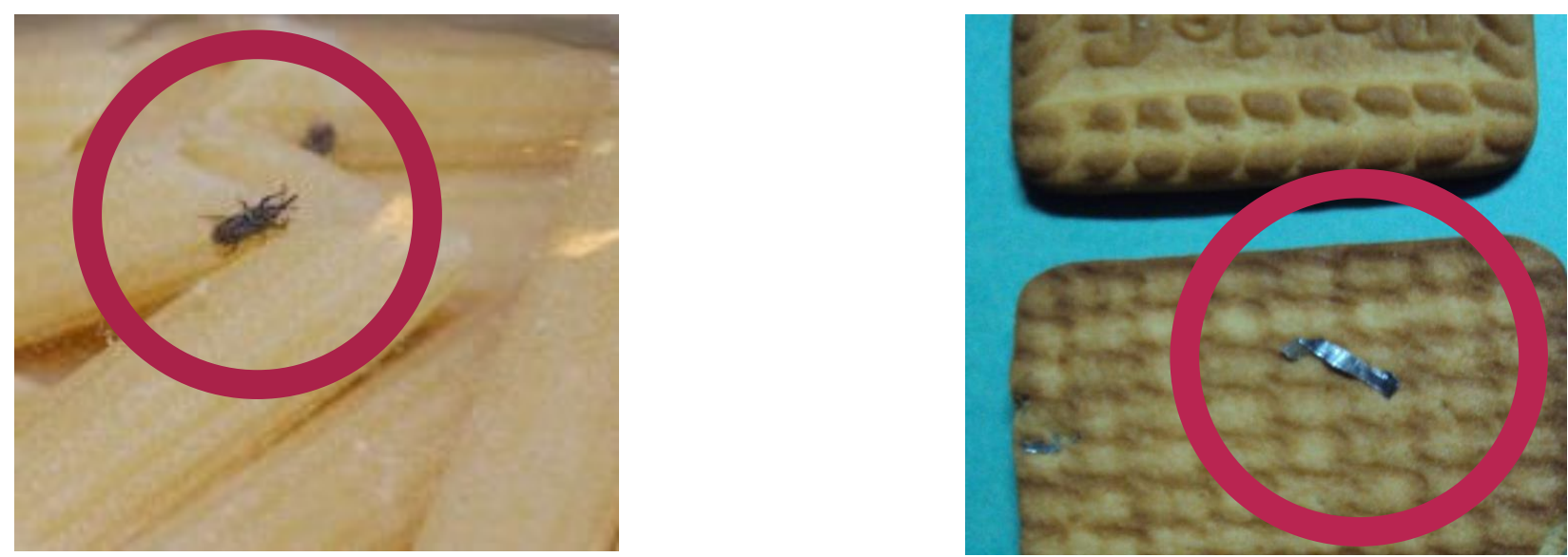
CAN WE FIND ORGANIC MATERIALS IN FOOD USING X-RAYS?



Author: Monica J. Emerson
Co-authors: Hildur Einarsson, Line Katrine Clemmensen and Bjarne Kjær Ersbøll.

PURPOSE

Would you like to find an insect in your food?



Or get injured while eating?

Food Quality Assurance is essential, both in regards to consumer satisfaction and also food safety.

The goal is to demonstrate the improvement introduced in foreign body detection by a new X-ray imaging technique when organic materials are potential foreign bodies.

NEW TECHNOLOGY

Soft matter cannot be identified with conventional X-ray, but it is found in higher contrast in other imaging modalities, such as phase-contrast and dark-field, based on refraction and scattering properties. All three modalities are available when using a grating-based interferometer (GBI).

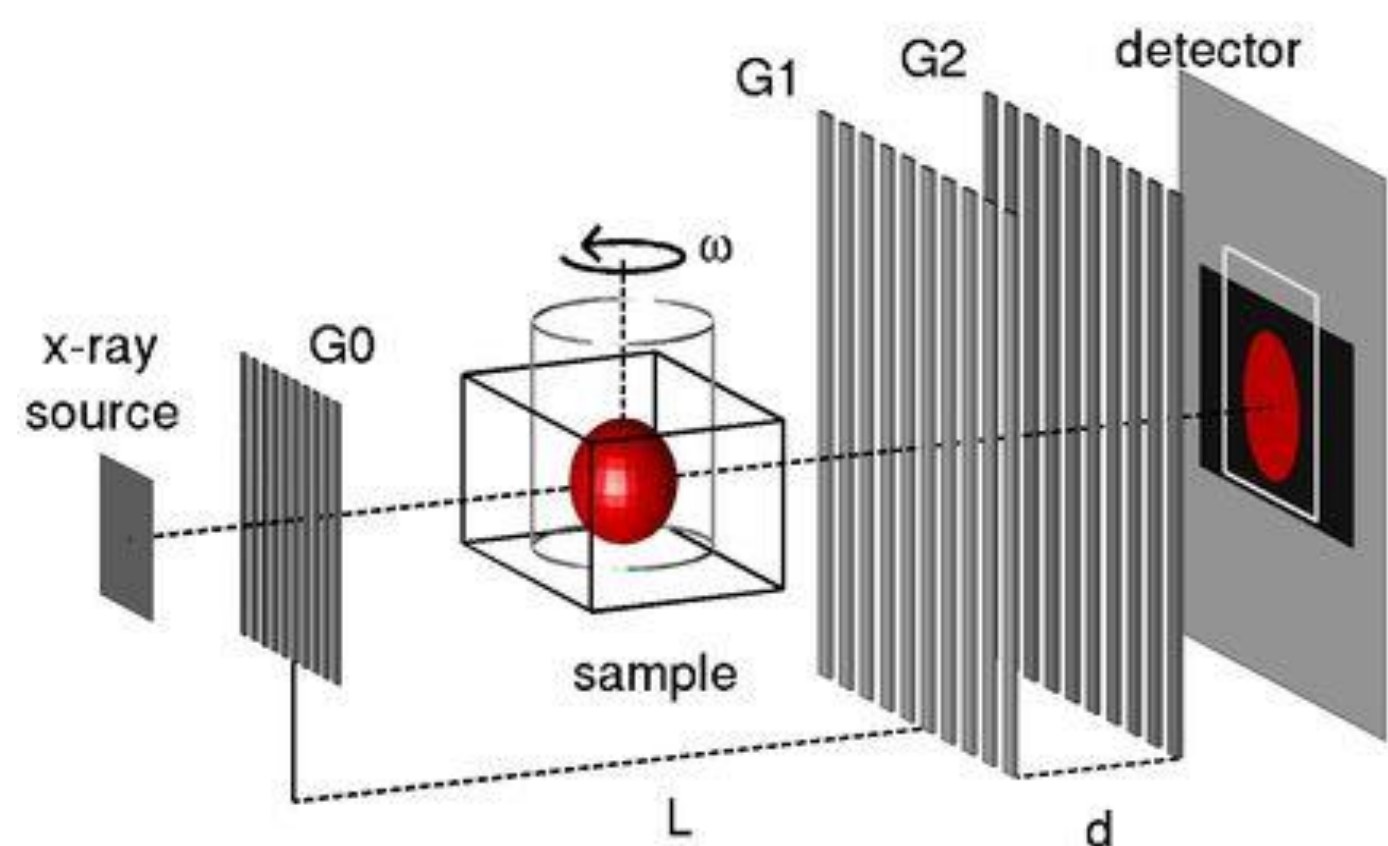
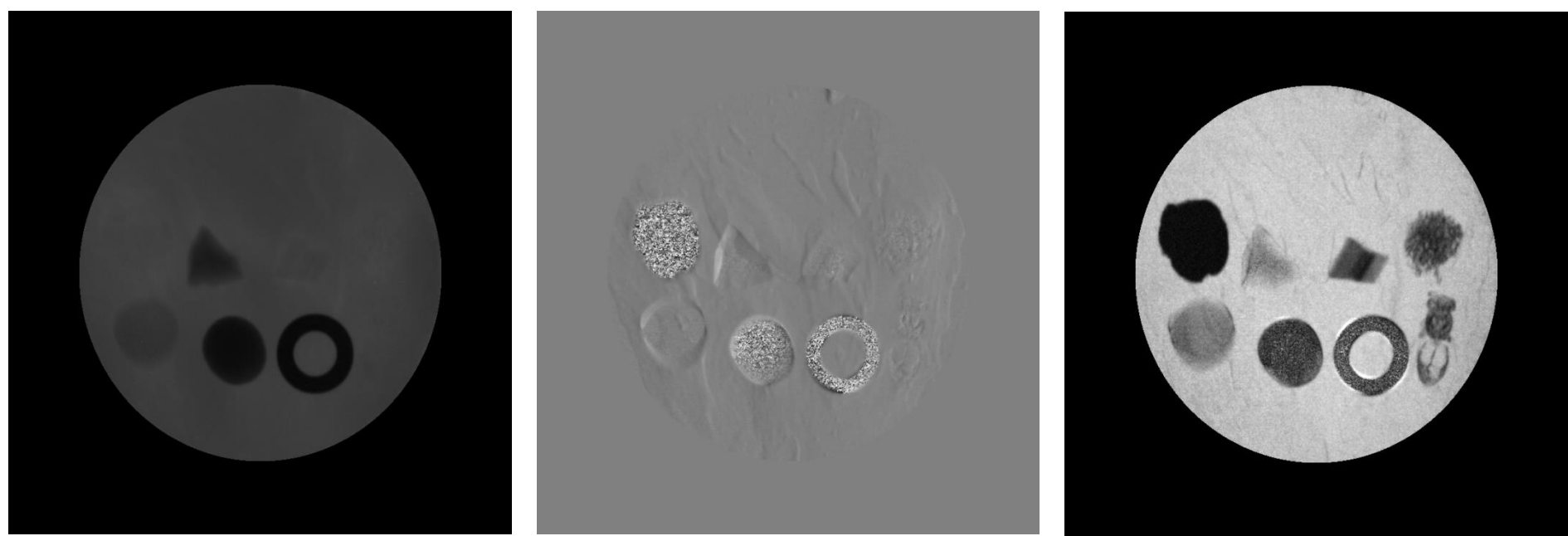
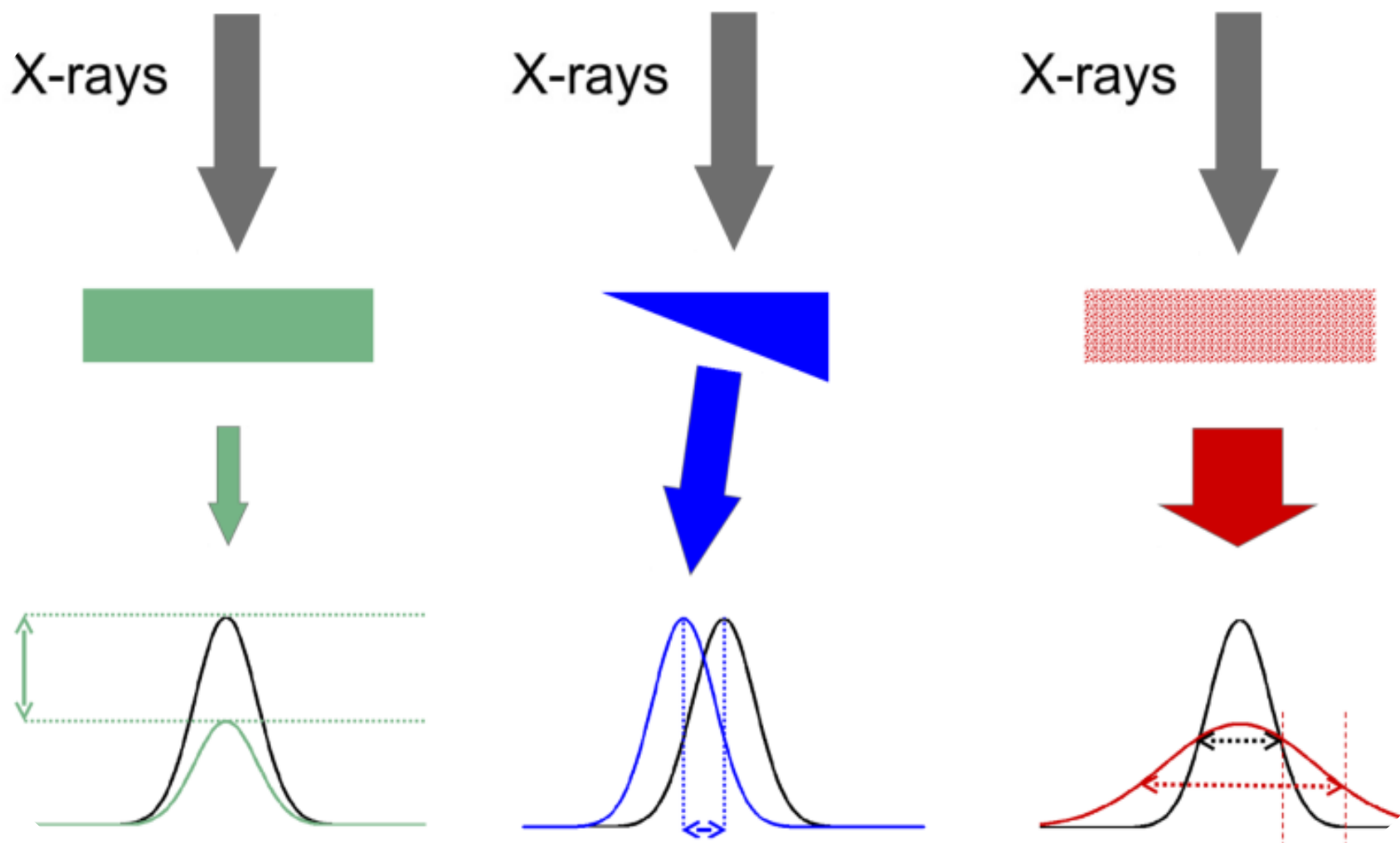


Figure 1. Sketch of a Talbot-Lau interferometer



a) Absorption b) Phase contrast c) Dark-field

Figure 2. GBI modalities capturing attenuation, refraction and scattering.

MATERIALS AND METHODS

Food samples: Cheese, Steak and Minced Meat.



Selection of foreign bodies

Different absorption, refraction and scattering properties
Different sizes
Suggestions NEXIM collaborators and Japanese survey

Hard plastic, soft plastic, rubber, stones, insects, metal, glass and wood.

GMM
Gaussian Mixture Model

Mahalanobis
distance

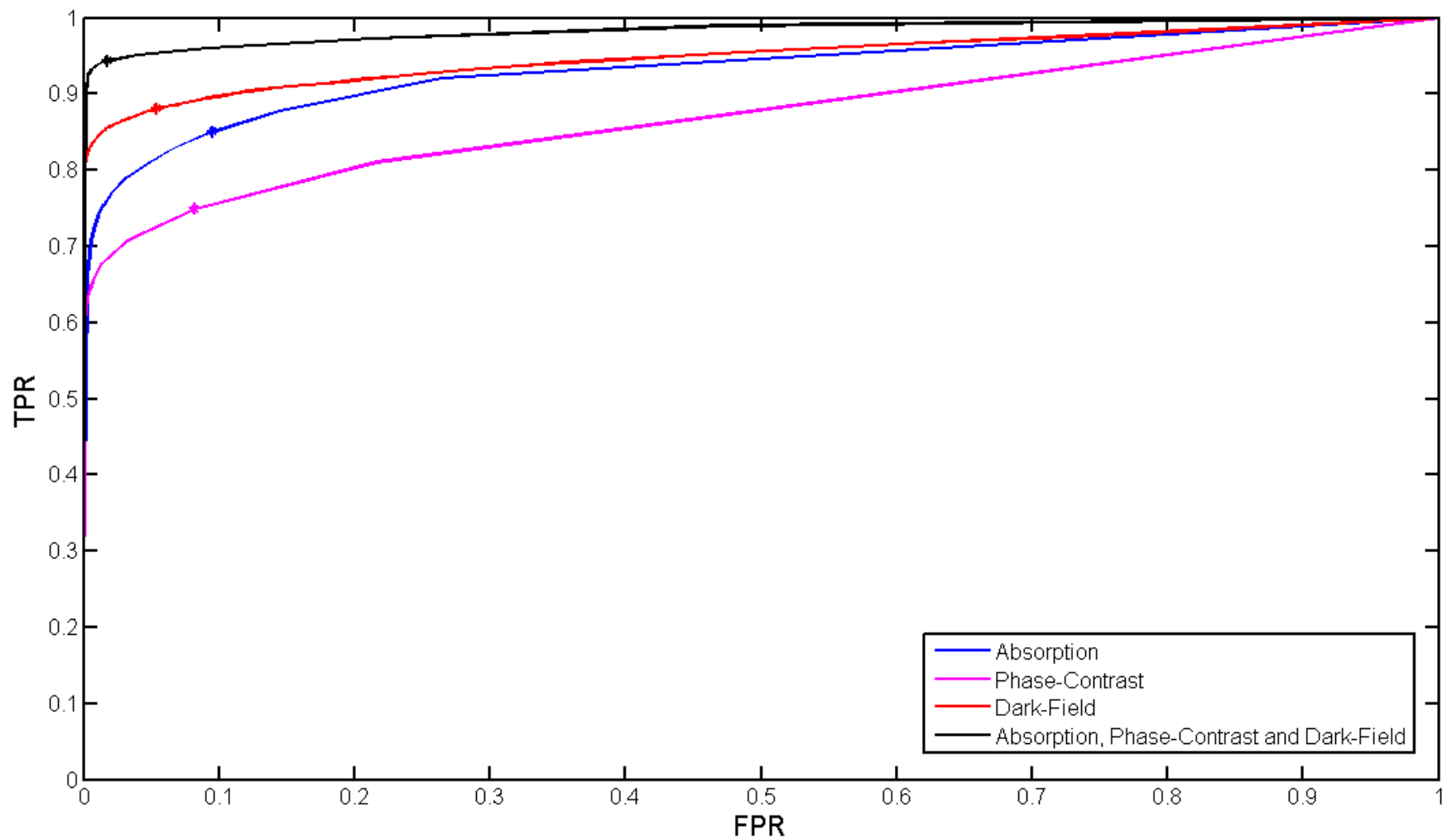
Hard
threshold

Results evaluation

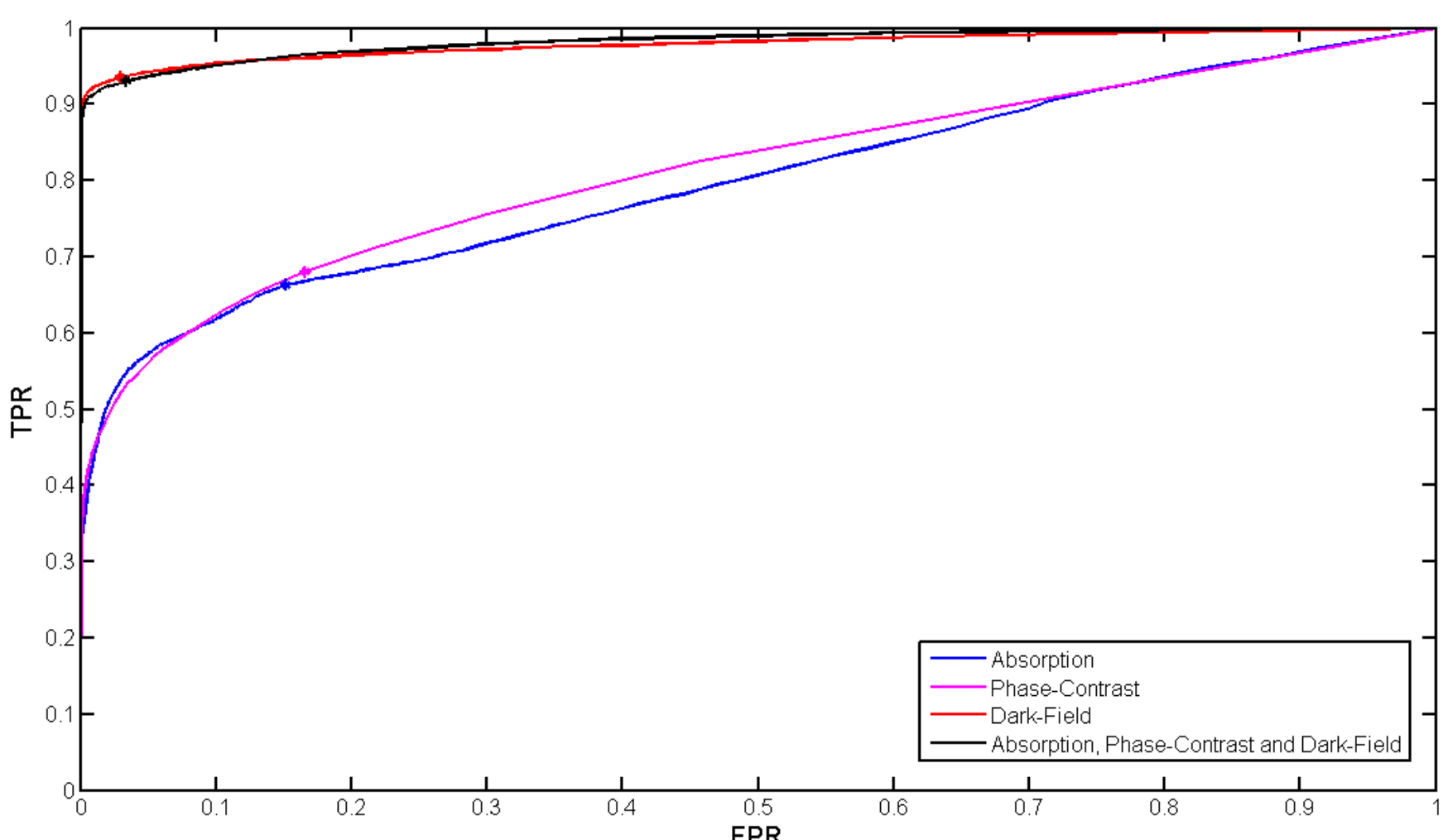
Figure 3. Steps in the design process of an automated foreign object detector.

RESULTS

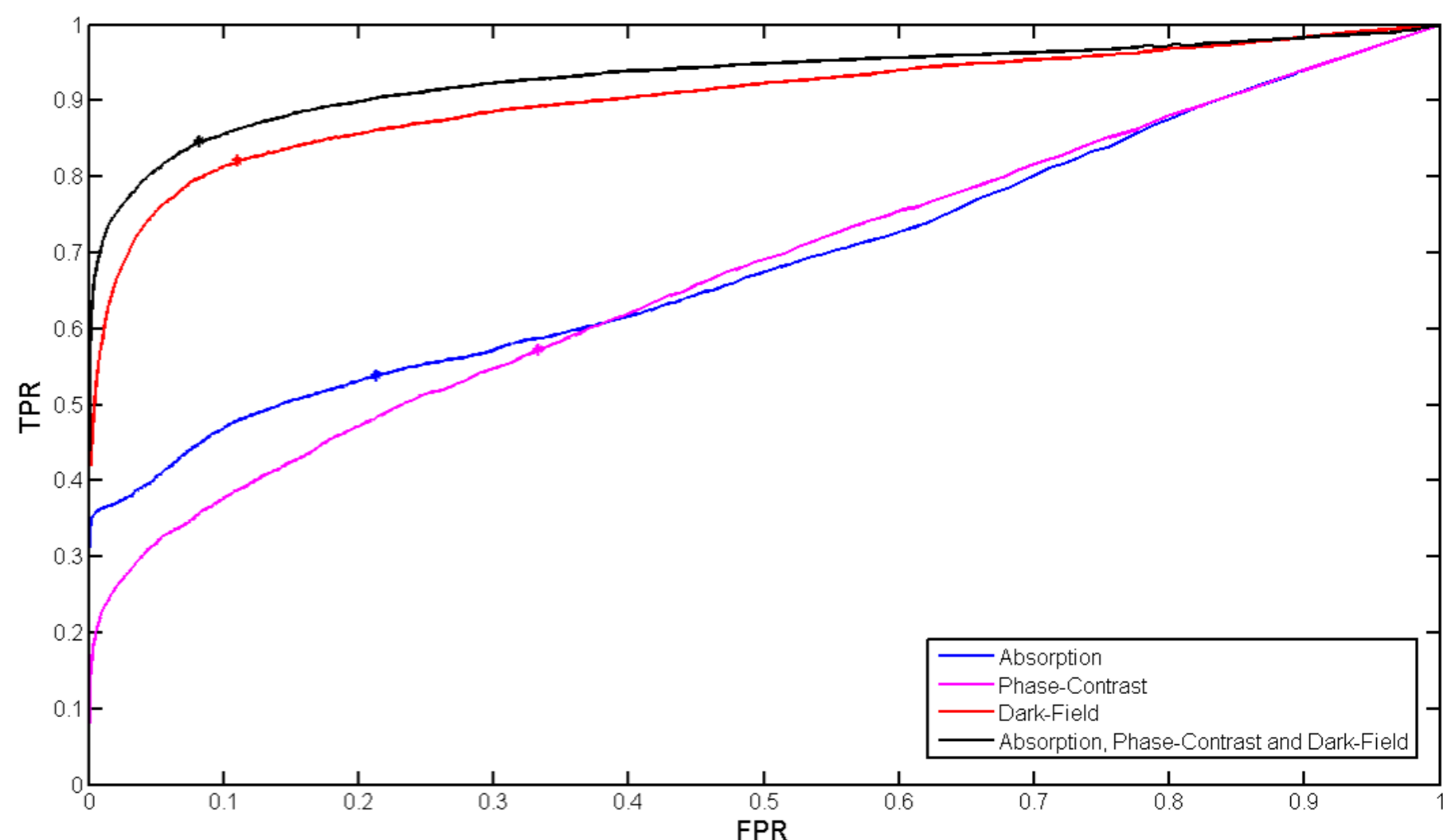
Cheese



Steak



Minced Meat



CONCLUSION

This new technology, GBI,

1. Allows to detect organic matter.
2. Outperforms typical X-ray when there is a mix of organic and non-organic foreign bodies.

More efficient than conventional X-ray for industries where organic materials are potential foreign bodies.